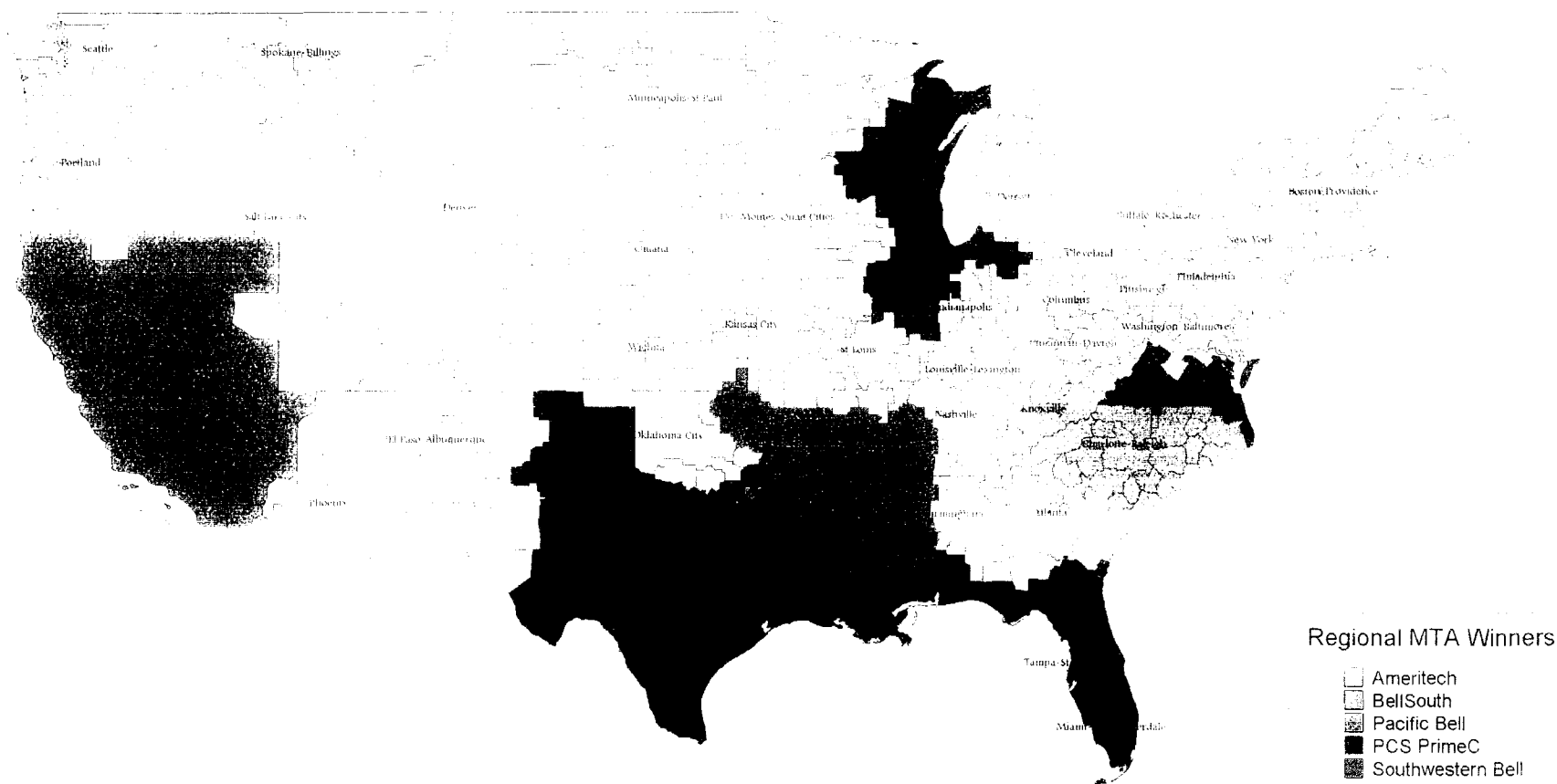
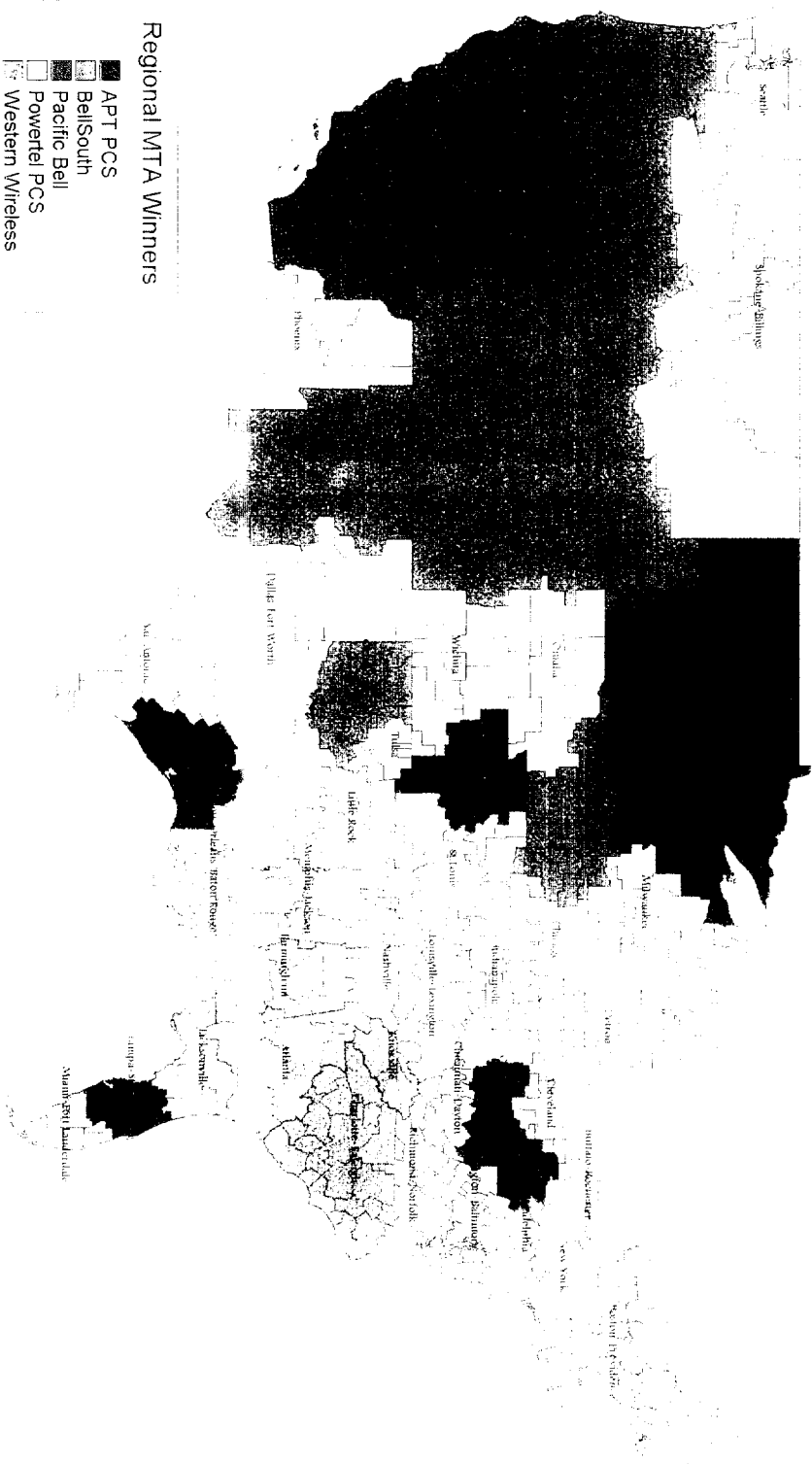


Regional MTA Winners



Regional MTA Winners



Top 5 C-block Bidders as of Round 123

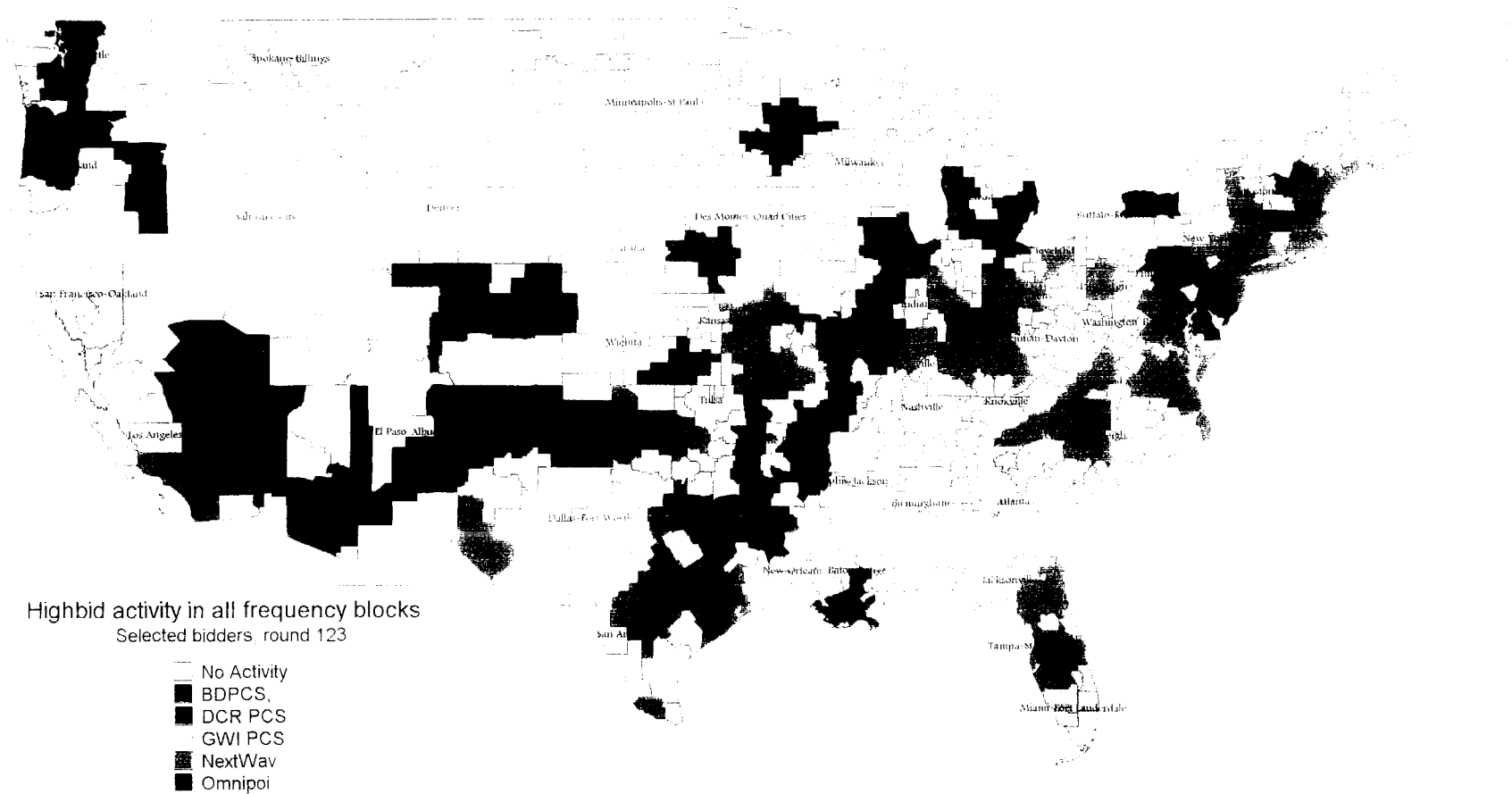
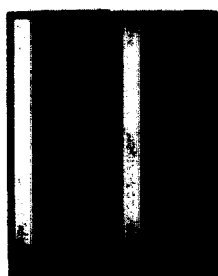


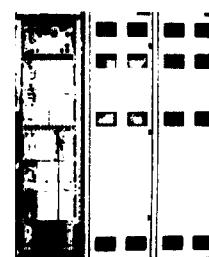
Exhibit 5

Base Station SubSystem



The Base Station SubSystem (BSS) interfaces between the mobile stations and the network. It is comprised of four entities: the Base Station Controller (BSC), the Operation and Maintenance Center (OMC), the Base Transceiver Station (BTS) and the Transcoder Unit (TCU). The BSC performs

efficient radio resource management and controls handoff between base stations, while the BTS organizes and manages the radio interface. Full configuration management and control of the BSS is provided by the OMC.



The **Base Station Controller (BSC)** is the nerve center of the BSS and resides in two small cabinets. The BSC manages all the radio resources of its BTS members including handoffs, traffic concentration and radio channel allocation. This results in load reduction on the switch and decreased operator transmission line costs. The BSC can be either centrally located or field deployed to provide traffic concentration for minimizing transmission costs.

The **Operation Maintenance Center (OMC)** is a user friendly graphical interface that provides operations and maintenance functions for the BSS. Services offered include security, configuration, fault, software, capacity and performance management. The OMC is based on standard commercial Unix servers and workstations.

The **Base Transceiver Station (BTS)** provides the radio interface between the network and the handsets. The BTS is modular and expandable which allows for flexible deployment and employs features such as dynamic power control and frequency hopping to improve mobile performance and cell quality. Northern Telecom provides Base Transceiver Stations for both indoor and outdoor applications. The Outdoor BTS, an environmentally discreet outdoor model, supports the same functions as the conventional Northern Telecom indoor BTS.

The **Smart Base Transceiver Station (Smart BTS)** is an enhanced version of the traditional BTS that utilizes advanced antenna technology and base station processors in an integrated cell site to dramatically increase the range of the cell.

The **Transcoder Unit (TCU)** provides the network transition from 64 Kbps μ -law speech to the system speech rate, allowing a 4 to 1 concentration of voice channels on the A interface. This reduces cost by reducing the number of T1 links required in the BSS interface.

General BSS Features

- Slow frequency hopping to improve cell quality and increase capacity
 - Both RF and baseband frequency hopping
- Voice activity detection/discontinuous transmission
- Dynamic power control on uplink and downlink
- Efficient reception diversity using maximum ratio combining
- Flexible handover algorithms and triggers
- Transmission configurations optimized for reliability and efficiency
 - Terrestrial and microwave transmission mediums
 - Supports star, daisy chain, and ring BSS configurations
- Configurable for omni, bi-sector, tri-sector, and six-sector cells

BSS Components

Base Station Controller

Features

- Controls multiple BTS sites: maximum of 39 sites and/or 128 cells or sectors
- 600 Erlang maximum capacity per BSC
- Duplicated main processors with a hot standby mode for high reliability
- Switching matrix for concentration of transmission links between network and BTS sites
- Distributed or centralized deployment flexibility
- Provides OA&M information to the OMC-R: alarms, traffic management, configuration control and BSS measurements

Physical Characteristics

- Dimensions: 6'8" x 2'7" x 2' per cabinet (two cabinets per BSC)
- Weight: 550 lbs. per cabinet
- Requires conditioned environments (+40° to +95° F)
- Operates on -48 V DC

Base Transceiver Station

General Features

- Implements an 8-channel GSM TDMA air interface
 - Each Transceiver (TRX) supplies a single GSM TDMA carrier
- Configured for omni or sectored sites
- Modular design to allow for growth from initial deployment to high capacity demands
- High reliability architecture
- Flexible combining options: diplexor, hybrid, and tunable cavity combiners
- Front accessible cabinet design for ease of deployment and maintenance
- Full drop and insert multiplexing facility to allow sharing of transmission links across multiple cell sites
- 30 watt transmitters
- 1850 - 1990 MHz operation

Indoor BTS

Features

- Up to 4 TRXs per cabinet, for a total of 16 TRXs (omni) or 24 TRXs (sectored) per site
- Can be deployed back to back or against a wall

Physical Characteristics

- Dimensions: 7'3" x 2' x 1' per cabinet
- Weight: Base cabinet - 573 lbs. (fully equipped)
Extension cabinet - 540 lbs. (fully equipped)
- Requires conditioned environments (+25° to +104° F)
- Operates on -48 V DC

Outdoor Mini BTS

Features

- Fully integrated cell site in environmentally hardened outdoor cabinet
 - Reduced deployment costs
 - Flexible site planning
 - Environmentally discreet

- Up to 3 TRXs (omni) or 9 TRXs (sectored)
 - Base cabinet - 3 TRXs
 - Up to two expansion cabinets - 3 TRXs each
- Self contained battery backup and power conditioning
 - 2 hours for transmit/receive, 4 hours for common functions
- Space for a microwave terminal or other ancillary equipment

Physical Characteristics

- Dimensions: 4'5" x 4'7" x 1'8" per cabinet
- Weight: Base cabinet - 1,058 lbs. (fully equipped, with batteries) Expansion cabinet - 1,071 lbs. (fully equipped, with batteries)
- Environmentally conditioned: -25° to +115° F
- Operates on 230 V AC (single phase)

Operational Maintenance Center

Features

- Manages a large BSS network through a Graphical User Interface and provides:
 - Security management with individual passwords and security classes
 - Configuration management for all BSS components
 - Fault management that consolidates information from the BSS components
 - Performance management for collection and display of real-time or historical BSS information
 - Software management provides automated software downloading and coordination of the BSS software infrastructure
- Allows continuous reconfiguration of the network to cope with increased traffic
- Redundant server configurations for high reliability
- Based on standard commercial Unix workstation hardware

Transcoder Unit

Features

- Sub-multiplexes 4 traffic channels onto a single DS-0 of the T1 link
- Each TCU cabinet can handle up to 4 BSS T1 links (a total of 384 voice channels)
- Can be deployed centrally to reduce transmission link requirements
- A single TCU cabinet can be allocated to different BSCs

Physical Characteristics

- Dimensions: 6'8" x 2'7" x 2'
- Weight: 550 lbs. per cabinet
- Requires conditioned environments (+33° to +104° F)
- Operates on -48 V DC

For further information, please contact your Northern Telecom representative.

To order additional copies, call 1-800-NORTHERN (1-800-667-8437).

Northern Telecom

2221 Lakeside Blvd.

Richardson, Texas 75082

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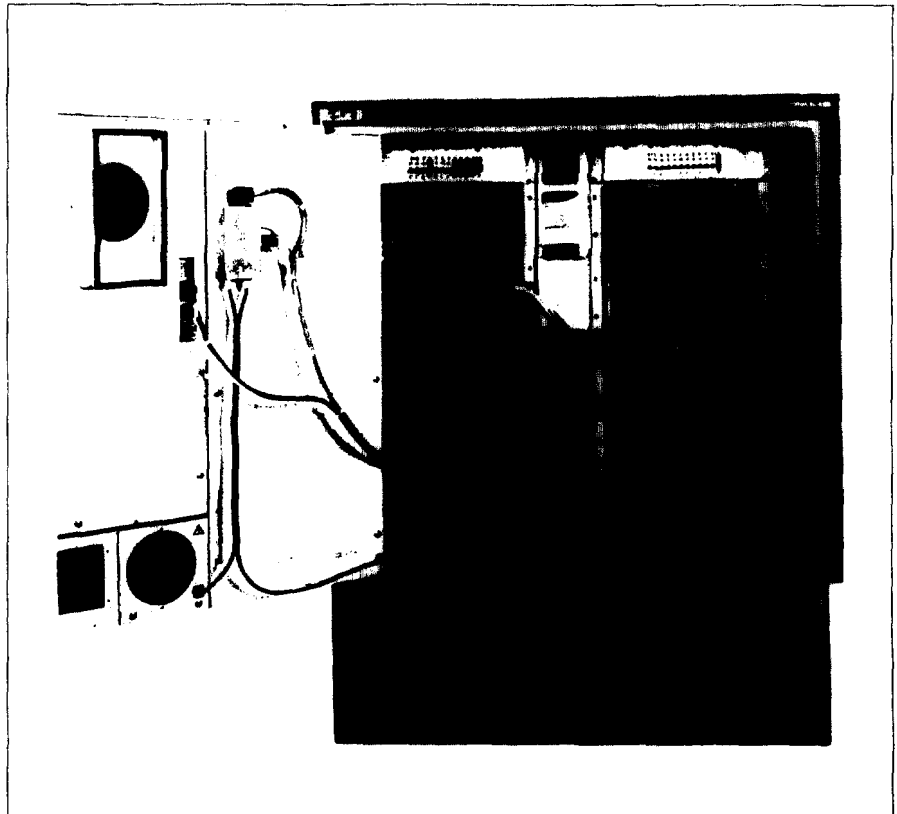
Printed in USA

September 1994

RBS 2102

Radio Base Station for PCS 1900

RBS 2102 – The Compact Outdoor Cabinet – A Six Transceiver Outdoor Base Station



General

The RBS 2000 is an integral part of Ericsson's CMS 40, the total system solution for PCS 1900. PCS 1900 is based on the internationally successful digital Global System for Mobile Communications (GSM).

Key features:

- Self-contained cabinet with 6 transceivers
- Outdoor cabinet
- Remote control and supervision
- Frequency Hopping (cyclically and randomly), DTX and Power control
- Supports new speech coders
- Mast-mounted Low Noise Amplifier (LNA)
- Supports omni and sector configurations
- Integrated power supply and backup batteries
- Advanced transmission capabilities
- Expandable
- Supervised by the OSS

The RBS 2000 family is the complete solution for Personal Communications Services (PCS) throughout the world. It is designed and optimized to enable rapid network roll-outs and to ensure low life cycle costs. Whether your applications are rural, suburban or urban, whether your site is indoors or outdoors, on a roof or on the ground, there will be an RBS 2000 product that fits your needs.

The RBS 2102 is an outdoor version of the RBS 2000. It is a powerful tool for operators interested in expandability of their system capacity. RBS 2102 contains up to 6 transceivers that can be used in omni or sector configurations. Several cabinets can be interconnected for support of high capacity configurations.

Technical Specifications

<i>Frequency band</i>		
	<i>Tx</i>	1930 - 1990 MHz
	<i>Rx</i>	1850 - 1910 MHz
<i>Number of Transceivers</i>		6
<i>Number of sectors</i>		1-3
<i>Transmission Interface</i>		1.5 Mbit/s (T1) or 2 Mbit/s (E1)
<i>Dimensions</i>		
	<i>Height</i>	62.6 in. (159 cm)
	<i>Width</i>	51.2 in. (130 cm)
	<i>Depth</i>	28.0 in. (71 cm)
<i>Max. Weight</i>		1320 lbs (600 kg)
<i>Transceiver Output Power</i>		35.5 W (45.5 dBm)
<i>Power into antenna feeder</i>		21 W (43.2 dBm)
<i>Receiver Sensitivity</i>		-107 dBm
<i>Power Supply</i>		
	<i>AC Voltage</i>	180 - 264 V
	<i>Frequency</i>	45 - 65 Hz
<i>Temperature range</i>		
	<i>Normal Operation</i>	-28 - +113°F (-33 - +45°C)
	<i>Non destruction</i>	-69 - +158°F (-40 - +70°C)

This device has not been approved by the Federal Communications Commission (FCC) and may not be offered for sale or lease, until such approval has been obtained.

Ericsson Radio Systems, Inc.
740 East Campbell Road
Richardson, Texas 75081
Telephone: (214) 952-8800
Fax: (214) 952-8783

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SCALA

PROFESSIONAL ANTENNA SYSTEMS FOR
BROADCAST AND COMMUNICATIONS

AMERICELL®

AMERICELL panels are the latest in a series of Scala's professional antenna products for fixed-station applications in the 1850-1990 MHz band, featuring:

- Extremely slim profile design make this antenna very acceptable for neighborhood applications.
- Very rugged construction using materials selected for long life and reliability, including copper dipoles, stainless steel hardware, and gray fiberglass radome.
- Superior electrical performance, with low VSWR, wide bandwidth and flat frequency response.

Specifications:

Frequency range	1850-1990 MHz (broadband)
Gain (ref. to isotropic dipole)	20 dBi
Impedance	50 ohms
VSWR	< 1.3:1
Polarization	Vertical
Front-to-back ratio	>25 dB
Maximum input power	200 watts
Inner conductor	D.C. ground
Horizontal 3dB beamwidth	65 degrees
Vertical 3dB beamwidth	4.5 degrees
Termination	7/16 DIN female
Weight	15.2 lb (6.9 kg)
Dimensions	76.7 x 6.1 x 1.4 inches (1948 x 155 x 35 mm)
Wind survival rating	120 mph (200 kph)
Shipping dimensions	79.5 x 6.5 x 2.6 inches (2020 x 165 x 65 mm)
Mounting	Fixed and tilt mount options can be ordered separately for 1.2 in. to 5.3 in. (30 to 135 mm) OD masts. Panel can be inverted at the time of installation.

Order Information:

Model	Description	Stock Code
AP20-1900/063D	Antenna with 7/16 DIN termination	
Note: The AP201900/063D is equivalent to model:		736-420

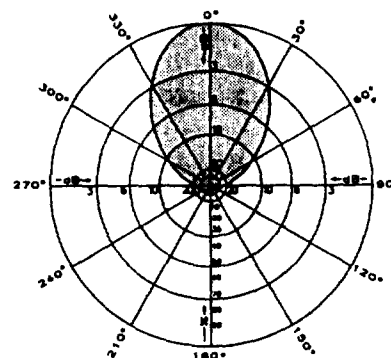
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SCALA ELECTRONIC CORPORATION

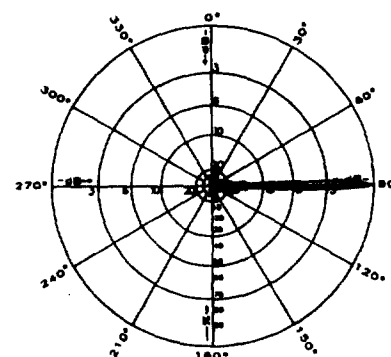
Post Office Box 4580
Medford, OR 97501 (USA)

Phone: (503) 779-6500
Fax: (503) 779-3991

PCS
AP20-1900/063D
20 dBi 63-degree
PANEL ANTENNA
(1850-1990 MHz)



H-plane
Horizontal pattern - V-polarization



E-plane
Vertical pattern - V-polarization

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PRELIMINARY

SCALA

PROFESSIONAL ANTENNA SYSTEMS FOR
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- Superior electrical performance, with low VSWR, wide bandwidth and flat frequency response.

Specifications:

Frequency range	1850-1990 MHz (broadband)
Gain (ref. to isotropic dipole)	21 dBi
Impedance	50 ohms
VSWR	< 1.3:1
Polarization	Vertical
Front-to-back ratio	>25 dB
Maximum input power	200 watts
Inner conductor	D.C. ground
Horizontal 3dB beamwidth	65 degrees
Vertical 3dB beamwidth	3.5 degrees
Termination	7/16 DIN female
Weight	19.8 lb (9 kg)
Dimensions	101.9 x 6.1 x 1.9 inches (2588 x 155 x 49 mm)
Wind survival rating	110 mph (180 kph)
Shipping dimensions	104.7 x 6.5 x 2.6 inches (2660 x 165 x 65 mm)
Mounting	Fixed mount options can be ordered separately for 1.2 in. to 5.3 in. (30 to 135 mm) OD masts. Panel can be inverted at the time of installation.

Order Information:

Model	Description	Stock Code
AP21-1900/063D	Antenna with 7/16 DIN termination	
Note: The AP21-1900/063D is equivalent to model:		736-419

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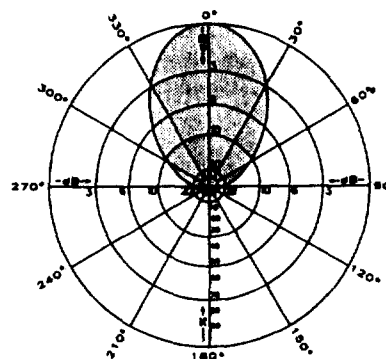
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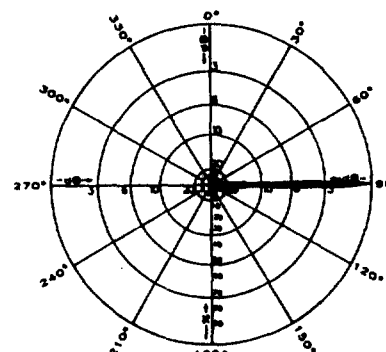
Phone: (503) 779-6500
Fax: (503) 779-3991

PCS AP21-1900/063D

21 dBi 63-degree
PANEL ANTENNA
(1850-1990 MHz)



H-plane
Horizontal pattern - V-polarization



E-plane
Vertical pattern - V-polarization

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SCALA

PROFESSIONAL ANTENNA SYSTEMS FOR
BROADCAST AND COMMUNICATIONS

AMERICELL®

AMERICELL panels are the latest in a series of Scala's professional antenna products for fixed-station applications in the 1850-1990 MHz band, featuring:

- Extremely slim profile design make this antenna very acceptable for neighborhood applications.
- Very rugged construction using materials selected for long life and reliability, including copper dipoles, stainless steel hardware, and gray fiberglass radome.
- Superior electrical performance, with low VSWR, wide bandwidth and flat frequency response.

Specifications:

Frequency range	1850-1990 MHz (broadband)
Gain	17 dBi
Impedance	50 ohms
VSWR	< 1.3:1
Polarization	Vertical
Front-to-back ratio	>25 dB
Maximum input power	250 watts
Inner conductor	D.C. ground
H-plane beamwidth	80 degrees (half-power)
E-plane beamwidth	6.5 degrees (half-power)
Termination	7/16 DIN female
Weight	10.1 lb (4.6 kg)
Height	51.5 inches (1308 mm)
Width	6.1 inches (155 mm)
Depth (maximum)	1.9 inches (49 mm)
Wind survival rating	120 mph (200 kph)
Mounting	Fixed and tilt mount options can be ordered separately for masts with O.D. of 1.2 in. to 5.3 in. (30 to 135 mm). Panel can be inverted at the time of installation.

Order Information:

Model	Description	Stock Code
AP17-1900/080D	Antenna with 7/16 DIN termination	01420-016

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Medford, OR 97501 (USA)

Phone: (503) 779-6500
Fax: (503) 779-3991

PCS

AP17-1900/080D

80° PANEL ANTENNA

17 dBi gain

1850-1990 MHz (broadband)



PATENT PENDING

Scala Electronic Corporation is a member of the Kathrein Group

QCP-1900 FEATURES AND ACCESSORIES



Slide-up earpiece extends for dialing and conversation. When not in use, simply push down for smaller profile and the keypad is locked to prevent accidental dialing.



The QCP-1900 offers you the freedom of 5-hours of talk time and 3-days (72 hours!) of standby time on a single battery charge. "Anytime, anywhere" is finally a reality with the QCP-1900.

Friendly "soft keys" work with four lines of text to guide you through each feature and function.

OUTSTANDING FEATURES

- CDMA digital talk and standby time. The standard battery provides 5-hours of talk time/3-days of standby time.
- Large, easy-to-read, 4-line backlit LCD display with informative icons
- 20-button keypad with oversized SEND and END keys
- Menu-driven interaction with prompts
- Computer/facsimile data compatibility
- Help menu
- Inherent privacy through CDMA encoding

CALL FEATURES

- Any key answer
- Auto/manual standard tone (DTMF) signaling
- Speed dialing
- Auto redial and answer
- 99 memory storage locations with alphanumeric tagging
- 10 secret number memory storage locations
- Separate memory for last 10 phone numbers dialed
- 32-digit dialing
- Flexible number/alphanumeric tag retrieval
- Linked numbers with pause
- Dial tone

CONTROL FEATURES

- Multiple call timers
- Flexible multi-level call restrictions
- Flexible lock features
- Programmable rings/alerts
- Auto service area alerts and roaming indicator

OTHER FEATURES

- Low battery sensor and alarm
- System preference selection
- Short Messaging
- Auto Power Save and Power Down

OPTIONS AND ACCESSORIES

- Desktop battery charger
- Leather case
- Cigarette lighter adapter
- Car kit
- Data adapters
- Handstrap
- Travel charger

TECHNICAL SPECIFICATIONS

Frequency Range: 1850-1910 MHz transmitter
1930-1990 MHz receiver

Battery Type: Lithium ion

No. Channels: CDMA: Wideband
19,000-38,000 voice channels

Size: 6.1" x 1.7" x 1.1"

Vocoder: QCELP-13

Weight: 8 ounces

RF Power Output: 200mW maximum

Operational Temperature: -30° to 60° C



QUALCOMM

Advanced Antennas

Northern Telecom's portfolio of advanced antenna products incorporates leading edge technology that provides an ideal solution for improving PCS performance and reducing deployment costs. These significant benefits are a direct result of Northern Telecom's extensive experience in and commitment to providing leading edge radio technology.



Smart Base Transceiver Station Portfolio

The Smart Base Transceiver Station (Smart BTS) utilizes highly developed antenna and base station technology in an integrated cell site to dramatically increase the range of the cell. This increase in range can reduce cell counts and improve building penetration. Additional benefits include reduced deployment and operating costs, reduced interference levels for tighter frequency plans, and a faster network rollout. As a result, the Smart BTS offers the PCS 1900 operator a significant cost and quality advantage.

The Northern Telecom Smart BTS includes a portfolio of flexible base stations, masthead electronics, and advanced antenna products designed to increase the cost effectiveness of PCS cell site deployment.

These products can be deployed in a variety of configurations to optimize individual site requirements and provide up to a -60dBm EIRP balanced link in a tri-sectorized arrangement. An integrated Smart BTS cell site provides the optimum in performance and site aesthetics, while a separately deployable masthead electronics package provides the operator with deployment flexibility. The current components of the Smart BTS portfolio include:

- **Masthead Electronics Unit (MEU)** - The masthead mounted MEU contains power amps, low noise amplifiers and the diplexor. The MEU is mounted at the antenna masthead to reduce feeder losses and can be used with conventional antennas. The MEU can be deployed in sectorized or omni configurations to provide the operator with deployment flexibility. The MEU is designed to be deployed in areas that require more flexibility than conventional BTS sites can provide.
- **Integrated Smart BTS** - The integrated Smart BTS components include:
 - **Outdoor Mini BTS Cabinet** - The Outdoor BTS contains all base station equipment needed for the Smart BTS cell site. Up to 2 transceivers per sector are supported. Future product releases will allow for larger cell site configurations.
 - **Integrated Smart Facet** - A visually attractive, integrated facet that contains all of the MEU equipment and four antenna sub-arrays in a single package. The integrated facet design improves the aesthetics and performance of PCS cell site deployments.

CellPlus Antenna

CellPlus antennas feature a unique design that utilizes flat panel array technology and polarization diversity to achieve substantial operator benefits by reducing site costs and improving the aesthetics of antenna deployment. CellPlus antennas are mounted on a simple monopole mast with one antenna per sector, reducing the bulky traditional antenna masts and improving deployment and zoning flexibility. Northern Telecom's unique technology delivers this significant improvement while still providing comparable benefits to spatially diverse multiple antenna arrays.



Cable TV Distributed Antenna System

Northern Telecom's investment in advanced radio and broadband transmission methods has resulted in a distributed antenna system that allows PCS 1900 systems to be deployed over Cable TV hybrid fiber/coax transmission networks. Through an integration of a low power distributed antenna system and Northern Telecom's BTS products, the coverage achieved is dramatically increased over traditional microcell deployments. The distributed antenna units are packaged in outdoor enclosures designed for Cable TV strand or utility pole mounting. The resulting system fully leverages the broadband cable network and offers a unique approach to PCS deployment. Thus, the Cable TV operator can offer consumers a full complement of wireless voice and data services with a cost effective deployment strategy that offers incremental revenue generation from the existing cable network.

Integrated Smart Base Transceiver Station

Features

- Implements an 8-channel GSM TDMA air interface
 - Each Transceiver (TRX) supplies a single GSM TDMA carrier
- Unique antenna design and four branch Maximum Ratio Combining diversity method
- Tri-sector operation supports up to 2 TRXs per sector
 - Future releases will allow expansion up to 4 TRXs per sector
- Fully integrated cell site in environmentally hardened outdoor cabinet
 - Reduced deployment costs
 - Flexible site planning
 - Environmentally discreet
 - Flexible BTS cabinet placement
- Self contained battery backup and power conditioning
 - 2 hours for transmit/receive, 4 hours for common functions
- Space for a microwave terminal or other ancillary equipment
- Options for bi-sector sites to cover highway applications
- High reliability facet design
- 1850 - 1990 MHz operation

Integrated Antenna/MEU Facet Physical Characteristics

- Dimensions: 5'8" x 2'7" x 1'
- Weight: Less than 180 lbs. per facet
- Environmentally conditioned: -58° to +131° F
- Powered by main cabinet DC power feeds
- Antenna Parameters:
 - 18.2 dBi peak gain
 - 80° nominal azimuth beamwidth
 - 4.5° minimum elevation beamwidth
 - ± 3° electrical downtilt (2.5° mechanical)

Smart BTS Cabinet Physical Characteristics

- Dimensions: 4'5" x 4'7" x 1'8" per cabinet
- Weight: Base cabinet - 1,058 lbs. (fully equipped, with batteries) Expansion cabinet - 1,071 lbs. (fully equipped, with batteries)
- Environmentally conditioned: -25° to +115° F
- Operates on 230 V AC (single phase)

Standalone Masthead Electronics Unit

Features

- Deployable with conventional sectored or omni antennas
- Operation supports up to 2 TRXs per sector (sectored) or 4 TRXs (omni)
 - Future releases will allow expansion up to 4 TRXs per sector
- Maximum Ratio Combining method
- Flexible BTS cabinet placement
- High reliability package design
- Utilizes conventional outdoor mini BTS cabinet

CellPlus Antennas

Features

- Dual polarization diversity allows performance comparable to conventional receive diversity to be achieved in an integrated antenna package
 - Improved cell site aesthetics
 - Lighter mast

- High gain tri-sector operation
 - 3 antennas per site, mounted around a monopole mast
- Flexible mounting options
 - Direct monopole attachments
 - Side of building mounting
- Null infill and beam profiling
- 1850 - 1990 MHz operation

Physical Characteristics

- Dimensions: 6' x 0.8' x 0.4'
- Weight: less than 40 lbs. (per antenna)
- Environmentally conditioned: -58° to +131° F
- Antenna Parameters:
 - 17.5 dBi peak gain
 - 85° nominal azimuth beamwidth
 - 5° nominal elevation beamwidth
 - 2 and 5° electrical downtilt (0 to 10° mechanical)
 - 100 watts mean power handling

Cable TV Distributed Antenna Systems

Features

- Maximum Ratio Combining and simulcast broadcast of signals offers a high level of system diversity
 - Increased cell range
 - Soft handover within simulcast cell
 - Lower power requirements at distributed antenna and mobile unit
 - Improved handset battery life
- Distributed antenna system minimizes field located BSS equipment
 - Rapid and simple deployment
- Designed for seamless integration with modern hybrid fiber/coax based broadband cable networks
- Environmentally protected antenna enclosures
 - Powered by cable network
 - Strand-mounted
- Integrated OA&M streams for common BSS network management
- 1850 - 1990 MHz operation

For further information, please contact your Northern Telecom representative.

To order additional copies, call 1-800-NORTHERN (1-800-667-8437).

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Richardson, Texas 75082

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Certificate of Service

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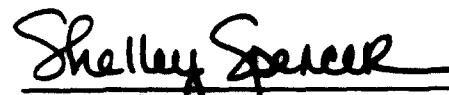
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